We Claim:

1. A method for producing a refractory metal carbide by a reaction-forming method comprising the steps of:

(a) casting an organic, resin-based liquid mixture into a mold;

(b) heating the organic, resin-based liquid mixture to suitable temperature and for a suitable period of time to cure the resin;

(c) heating the cured organic, resin-based mixture to a suitable temperature, for a suitable period of time, to pyrolize the cured resin mixture to produce a pyrolized preform; and

(d) placing the pyrolized preform on a bed of refractory metal at a temperature above the melting point of the metal such that the molten metal wicks inside the porous carbon preform and reacts, forming a refractory metal carbide.

2. The method of claim 1, wherein the refractory metal in step (d) comprises a refractory metal silicide.

3. The method of claim 1, wherein the refractory metal carbide has the same geometry as the mold in step (a) and the mold geometry is a complex shape.

4. The method of claim 1, wherein the organic, resin-based liquid mixture comprises one or more organic-based resins, one or more glycols, a curing catalyst, and one or more refractory metal carbides.

5. The method of claim 1, wherein the organic, resin-based liquid mixture comprises a furfuryl alcohol resin, diethylene glycol, triethylene glycol, p-toluene sulfonic acid, and one or more refractory metal carbides, in powder form, selected from the group consisting of graphite, silicon carbide, zirconium carbide, titanium carbide, hafnium carbide, vanadium carbide, molybdenum carbide, niobium carbide, tantalum carbide, chromium carbide, or tungsten carbide.

6. The method of claim 1, wherein the curing step (b) is carried out at a temperature of 50°C to 200°C, the pyrolysis step (c) is carried out at a temperature of 500°C to 1,200°C, and the infiltration step (d) is carried out at a temperature of 1,300°C to 4,000°C.

7. The method of claim 5, wherein the density and chemical composition of the refractory metal carbide is controlled by altering the composition of the organic, resin-based liquid mixture.

8. The method of claim 1 wherein the processing temperature required for the infiltration step (d) is controlled by altering the composition of refractory metal used by the addition of silicon to the refractory metal composition and the infiltration step (d) is carried out at 1,300°C to 2,500°C.

9. The method of claim 1, wherein the organic, resin-based liquid mixture in step (a) comprises high-temperature fibers.

10. A method for producing a refractory metal carbide by a reaction-forming method comprising the steps of:

(a) casting an organic, resin-based liquid mixture comprising one or more organic-based resins, one or more glycols, a curing catalyst, and one or more refractory metal carbides into a mold;

(b) heating the organic, resin-based liquid mixture to 50°C to 200°C for a suitable period of time to cure the resin;

(c) heating the cured organic, resin-based mixture to 500°C to 1,200°C for a suitable period of time to pyrolize the cured resin mixture to produce a pyrolized preform; and

(d) placing the pyrolized preform on a bed of refractory metal at a temperature of 1,300°C to 4,000°C, wherein the temperature is above the melting point of the metal, such that the molten metal wicks inside the porous carbon preform and reacts, forming a refractory metal carbide.

11. The method of claim 10, wherein the resin comprises a furfuryl alcohol resin, the glycol comprises one or more glycols selected from the group consisting of diethylene glycol and triethylene glycol, the curing catalyst is p-toluene sulfonic, the refractory metal carbides are selected from the group consisting of graphite, silicon carbide, zirconium carbide, titanium carbide, hafnium carbide, vanadium carbide, molybdenum carbide, niobium carbide, tantalum carbide, chromium carbide, or tungsten carbide, and the refractory metal in step (d) comprises a refractory metal silicide.

12. A refractory metal carbide prepared by a reaction-forming method comprising the steps of:

(a) casting an organic, resin-based liquid mixture comprising one or more organic-based resins, one or more glycols, a curing catalyst, and one or more refractory metal carbides into a mold;

(b) heating the organic, resin-based liquid mixture to 50°C to 200°C for a suitable period of time to cure the resin;

(c) heating the cured organic, resin-based mixture to 500°C to 1,200°C for a suitable period of time to pyrolize the cured resin mixture to produce a pyrolized preform; and

(d) placing the pyrolized preform on a bed of refractory metal at a temperature of 1,300°C to 4,000°C, wherein the temperature is above the melting point of the metal, such that the molten metal wicks inside the porous carbon preform and reacts, forming a refractory metal carbide.

13. The refractory metal carbide of claim 12, wherein the refractory metal in step (d) comprises a refractory metal silicide.

14. The refractory metal carbide of claim 12, wherein the refractory metal carbide has the same geometry as the mold in step (a).

15. The refractory metal carbide of claim 14, wherein the mold geometry is a complex shape.

16. The refractory metal carbide of claim 12, wherein the resin comprises a furfuryl alcohol resin.

17. The refractory metal carbide of claim 12, wherein the glycols comprise one or more selected from the group consisting of diethylene glycol and triethylene glycol.

18. The refractory metal carbide of claim 12, wherein the curing catalyst is p-toluene sulfonic.

19. The refractory metal carbide method of claim 12, wherein the refractory metal carbides are selected from the group consisting of graphite, silicon carbide, zirconium carbide, titanium carbide, hafnium carbide, vanadium carbide, molybdenum carbide, niobium carbide, tantalum carbide, chromium carbide, or tungsten carbide.

20. The refractory metal carbide of claim 12, wherein the refractory metal carbides are in powder form.